GRADING ART PRODUCTS

AND

ITS EFFECT ON STUDENT INTEREST IN ART

A PAPER

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PROBLEMS IN ART EDUCATION

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OUTLINE

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INTRODUCTION

In our complicated and over-crowded world, we begin to get caught up in the draft of in-human feeling prevalent to a society at this stage of development. To maintain a feeling of human dignity and individual importance requires a great deal more concentration as our society advances. One of the most effective ways of controlling any disease is through prevention rather than trying to cure it. This is especially true of mental conditions or life styles that are incompatible with the environment. Treatment or change comes hard if not impossible.

In order to prevent the condition one must try and eliminate the causes. One of the most serious causes is the effect on the self-concept caused by improper guidance or treatment of the human creative expression. The main concern here being expression through the arts. Coleman points out:

> "In a general sense, all problem solving is creative; each problem is unique in certain respects and each solution requires the integration of ideas into new and meaningful patterns. On another level, creativity may manifest itself in the speculations of the philosopher and the hypothesis of the scientist; on still another, in the works of the painter, the sculptor, the composer, the novelist, and the poet. Then, too, on the every day level, there is the creative

thinking that changes one's own personality. It can produce insights into some phase of oneself or one's world which one has not seen before - insights which may drastically alter one's assumptions, motives and ways of behaving." (10.pp. 390)

Education operates on the premise that you need some way of evaluating student progress so any form of educational process including art activity is subject to evaluation or grading.

Though many districts have exempted art activity from grading, many have not, and those that have, do not have control over the individuals that are responsible for student progress and though an actual grade does not appear on a card or report, evaluation still takes place.

If this is compared to other areas of the curriculum and what criteria is used for grading, one can easily understand the difference in evaluating a creative product. For instance, at the elementary stages of development a child draws or represents what "he knows" rather than what he sees. To make an honest evaluation you would have to know what he knows. Obviously this is impossible so the validity of an evaluation of the product is questionable. It is especially questionable to the student if he is indeed satisfied with the result and product.

Grading in math or science for instance indicates the child's relative position to others in his understanding of the subject or his ability to grasp the knowledge contained in the subject. A grade of "C" would mean he is average and to be able to raise that grade would mean changing something so he could do better than those a level above him. In other words, he could get 80% of his test answers correct

rather than 70%. This same criteria is often transferred to art grades. If a "C" was received on a painting, then something must change to get a "B". This process of changing is the problem. It is not as simple as a right or wrong answer. To each person it is a different answer, a different feeling.

In a paper entitled "Grades as Reinforcers in the Production of Attitude Change", Robert Bostrom found that the awarding of an "A" on an essay produced significant change in attitude toward the subject, while the grade of "D" and the "no grade" did not. When answering a question as to the satisfaction the subjects felt about their essays after the rewarding of a grade, 42 of the 52 who received "A" were satisfied with their essays and of the 57 who received "D" only 12 registered satisfaction and 12 of the 57 who received "no grade" also were satisfied.

It's a difficult if not impossible task to put a value on a human body. It's even more difficult to put a value on a human life. We do know however, that we only have one life and if that life happens to be yours or your child's, then the quality of that life becomes important to us.

One of the things that affects quality is the early art experiences that a child has. Notice that we refrain from saying art training and instead refer to art experiences. Training is something we engage in when we want an artist to be the desired outcome, experience is something that we provide when we desire an individual to become a human. Bugelski makes this observation:

> "The objective of schools and teachers has never been to train people how to think (and those courageous

> souls who have made this their objective have very little to show for their efforts). Rather the objective of education has been to teach people what to think and to provide the appropriate backgrounds for whatever thinking is going to be done." (1. pp. 194)

This system obviously does not put a high value on creative activity or as Torrence describes it, "divergent thinking".

I think most everyone you will read will agree that creative expression is highly personal and an individual is very sensitive about it. This is understandable as this expression usually involves one's innermost feelings and emotions. The reaction a person has toward observation of his creative work as opposed to some other sort of endeavor is quite different. Failure or doing poorly in anything, of course, has its effect but it doesn't seem to hurt quite as deeply if it is not a product of the creative endeavor. I think, especially at the elementary level, that a child expresses freely for the purpose of communicating or expressing and doesn't intend that the product be subject to evaluation. It was really meant to just make a statement.

> "It is part of the teacher's job to criticize the creative products and the reasoned judgements of his students. Only by showing them where and how to improve can the teacher help his pupils to grow in their productive and judgemental ability. But criticism can be a blow to self-confidence if it is not administered with care." (5. pp. 395)

As soon as we begin to evaluate, then the child begins to respond to the

pressure and tries to do what he is supposed to usually on our adult terms which becomes the dominate force, and expression is shoved into the background. It is logical that this must create a frustration within the human involved. Should this frustration continue over a long period of time or intensify, it will take its toll, not in art ability, but in human development.

In a study by Waterhouse and Child on "Frustration and the Quality of Performance", they found that:

> "Frustration will produce a decrease in the quality of on-going performance, to the extent that the frustration evokes other responses which interfere with that on-going performance. Experimental studies of frustration frequently fall into this category, since frustration is viewed as a threat to the ego. It is hardly deniable that teachers and classrooms produce frustration. In fact, some teachers use the amount of frustration as an indicator of success: the more frustrated the students are, the better! Progressive educators, however, have bitterly opposed punitive practices, including frustration, on the general contention that only happy learners are good learners. Even Skinner has warned us about 'aversive practices' and has attempted to design learning programs which are easy enough to help the student avoid all mistakes. Bugelski, however, has contended that learning cannot be sufficiently motivated without anxiety and that the teacher's job is not to remove anxiety from the learning situation but rather to

regulate its level so that there is neither too much nor too little." (11. pp. 117-118)

When we refer back to Phase I of this study, we can imagine the frustration felt by a student who was satisfied with his product only to find that it received an "F" under instructor evaluation. Had the student known that still another instructor had awarded an "A", the frustration level as well as the level of confusion would be understandably extremely high.

Once it has been established that some sort of an evaluation is needed to provide motivational pressure, then it becomes important what type of evaluation should be used. I am still convinced that a grade should not be put on a final creative product but rather upon the experience while arriving at the final product. There were several factors considered: the type of evaluation or reinforcement, the frequency of reinforcement and what the reinforcement should be.

> "The enlightened art teacher will not interfere with those aspects of the child's art that are characteristic of his age, unless the child is on the verge of progressing from one level to the next and seems to need only a little encouragement to make the step. He will, on the other hand, try to increase the vitality, originality, and coherence of his student's work as best he can." (7. pp. 7-8)

In relation to the type of reinforcement I was considering basically positive or negative reinforcement:

> "Skinner has consistently derived the use of punishment or 'aversive stimulation' as a means of behavior control. He believes that positive reinforcement is a far more effective operation and without undesireable side effects." (1. pp. 86)

While Lowenfeld frowns on undue praise, he says:

> "What has been said about praising the child applies in even greater measure to criticism. Undue criticism is more harmful than undue praise. Since our criticism is usually based on our adult taste, it will not fit the child's needs." (7. pp. 20)

While positive reinforcement certainly seems the direction to go, it may not always be easy to initiate. While an elementary art supervisor, I observed an experienced teacher gazing at a child's drawing and promptly asked the student if he couldn't do a little better. In discussing this with the teacher he saw this as positive reinforcement. To the child it was negative reinforcement as it indicated that something was wrong with the drawing and the child couldn't see what. Positive reinforcement must be carefully chosen.

Frequency was then considered and I referred to Hull's research:

> "Determine the relative need for practice at each step in a sequential act and schedule such differential practice, including the separate reinforcement of each step, until all parts of the task are equally well learned." (1. pp. 81)

Lowenfeld describes it this way:

> "There is another very important factor to remember before you criticize your child's art. Avoid criticism after the work has been finished. The most effective criticism is the help you can give your child during the process of working." (7. pp. 21)

This also reinforces my original idea of not evaluating the final creative product but rather the work that goes into it.

As the student works then we should look for positive behavior patterns or responses that indicate the desired learning that will eventually help the student reach the desired creative outcome. These responses should be those that we should like to reinforce. Skinner says:

> "The important factor is the response itself. If this occurs, then, says Skinner, a reinforcement will increase the probability of its repetition or recurrence." (1. pp. 87)

Obviously a desired outcome would be to repeat the learned experience for future success. One must be aware, however, of the suggestion of rigidity in the experience when we speak of reinforcing desired outcomes or responses. They would be the easiest to recognize and reinforce if they were standard with each learner. We must remind ourselves that this will not be the case and should not be the case in creative activity. In fact, one of the unique contributions that creative activity makes to the educational process is experience in divergent thinking. (Torrence's definition)

> "If we expect our learners to adjust readily to novel situations or to surmount obstacles and difficulties, we must prepare them for such occasions by deliberately instituting alternate routes to goals wherever possible. To teach only on habit, to practice only one routine, results in intellectual rigidity." (1. pp. 80)

To follow this advice makes the job of evaluation far more difficult. It not only suggests individual evaluation, it dictates it, a job not easily done with one instructor and 30 students. This also indicates the relativity of the evaluation. Obviously the evaluation can only be relative to the individual student that is experiencing the work required to produce the creative product. Lansing describes it this way:

> "The instructor will not succeed in generating a broad feeling of self-confidence in his pupils if he compares the work of one child with that of another for purposes of showing how one is superior to the other. After all, a visual symbol is a presentation of the self; it is an exposure of personal concepts, emotions, and skills. For that reason an attack upon the symbol often is felt as an attack upon the person that made it." (5. pp. 396)

Self concept after all, is the single most important factor we are considering within this study and the best way to improve it is by providing well designed experiences to meet the student's needs and help the student to find success within that experience.

CHAPTER 1

I. THE PROBLEM

STATEMENT OF THE PROBLEM

It is the purpose of this study to show whether or not there is consistency in a letter grade system applied to creative art projects done by students. It was decided before the experiment that the Pearson correlation coefficient method would be used and if a coefficient of .8 could be obtained, then we would consider the grading system valid enough for continued use.

IMPORTANCE OF THE STUDY

It has been pointed out many times that creativity is a highly important asset to an individual. A great deal of study and effort has gone into researching areas where creativity might be discouraged rather than encouraged. Most school systems have recognized that grading creative products in the elementary school can have a very detrimental effect on creative growth and have eliminated it at this level. On the secondary level, however, the letter grade on a creative project is still the main system for evaluation.

An art project deals with feelings and tastes and where a student feels success, it may not suit the tastes of the instructor. On the other hand, a student may feel a definite lack of success only to have an instructor give it a very confusing high grade. A series of low grades where the student is honestly trying can obviously have an effect on his motivation. At the junior high level where a student is searching for

himself and searching for acceptance as well, he can obviously find a series of low grades quite discouraging to say the least.

If the grading system has a consistency or validity, then the grade is honestly indicating something about the student's learning. If, however, it does not have validity, then it could be needlessly giving the student the wrong impression. Should the latter be true then we must look for something to replace the present system.

II. THE EXPERIMENT

THE DESIGN OF THE EXPERIMENT

To find out what kind of consistency we had among instructors, forty-five projects were selected out of one grade level. The grade level selected was the seventh grade because of the adjustment problems at this level. The student is trying to adjust to an adult life as well as a new school situation. Therefore, his genuine success or failure is quite important to his development. It was decided that the group of forty-five projects would be assembled and numbered and all secondary instructors would assign a letter grade based on the usual criteria, balance, effective use of material, design, and imagination in solving the problem. Each teacher recorded the results on Form 1 (Fig. 1). Each instructor was then assigned a number and each form was re-recorded on Form 2 (Fig. 2). Each letter grade was then assigned a numerical value for computational purposes. This data was then again recorded on Form 2 (Fig. 3). This data was then submitted to a scattergram and the Pearson Correlation formula as illustrated in Table I (Fig. 4). Comparisons were drawn at random comparing each teacher at least once with someone else.

Although 105 combinations exist (using the formula $(r) = \frac{n}{(r!)(n-r!)}$ then $\binom{15}{2} = 105$) and realizing that some of these are duplicates, it was felt that figuring thirty-seven of these comparisons would give sufficient evidence to indicate a consistency.

The data as it was figured was then submitted to a graph in the order it was done. This is illustrated in Table II (Fig. 5). In order that the correlation trend could be more easily seen, the data was put in order from the lowest value to the highest. This is illustrated in Table III (Fig. 6).

II.

MATERIALS USED AND GROUPS STUDIED

The materials used and the group that participated were under actual educational conditions. The materials were gathered over a period of one school year to acquire a good random sample and the instructors that participated were full-time classroom instructors.

MATERIALS USED There were three art problems used.

PROBLEM I. Create a wall hanging using a box or frame loom. Use a variety of materials and techniques as demonstrated in class.

PROBLEM II. Create an imaginary animal or insect using a variety of wire. Furnace cement or plaster can be added for variety.

PROBLEM III. Create a poster or advertisement within a three-dimensional box. Use a social problem as the theme. Utilize the three-dimensional quality of the box.

Materials for the problems were provided by the school and the student. The time for the problems varied from three weeks for the weaving to one week for the wire sculpture. The class met five days a week and forty minutes a day for each class period.

STUDENT GROUP

The group selected was grade seven. It consisted of both boys and girls and the classes were co-educational. Each student was assigned a number. There were 344 students total. Forty-five student numbers were selected from a table of random numbers. Of the numbers selected, twenty-six were female and nineteen were male. They represented a good cross section of intelligence levels as well as a good dispersement in grade averages.

EVALUATION GROUP

There were twelve instructors that participated. Six of them were senior high school teachers and six of them were junior high school teachers. The experience level ranged from first year teacher to thirteen years of experience. In the total group there were seventy-one years of experience which is an average of 5.9 years of experience per instructor. Seven members of the group were males and five members were female.

Each instructor was assigned a number. They entered this number on their grading form. Each of them graded the forty-five projects alone and all of the projects were displayed the same for each instructor. They were given the problem descriptions as given to the students. After three weeks had passed since the first grading session, three of the instructors were randomly selected to regrade the projects. They did not know at the

first grading that they would be asked to do this. This made a total of 15 gradings, three of them having the same instructor number so each column was assigned a data number as indicated on Form 2 (Fig. II & III).

III. SUMMARY

Although we can't be sure of the result of any one grade or groups of grades upon an individual, I think we can agree that if there is a possibility of any negative effect on creativity or the growth and development of the individual's personality, then the chance is not worth taking. We must evaluate very carefully the purpose the grade is supposed to serve and whether or not it in fact does this. Second, we must determine if the system being used is a valid system that the student can understand. At this age especially the understanding of his progress is extremely important to the growth and development of the student.

The experiment was conducted to try to discover what kind of consistency was prevalent in the present grading system.

IV. CONCLUSION

The statistical evidence shown in the experiment clearly shows a lack of consistency among evaluators while grading creative products. A survey of Figure II shows the variability of the grade as assigned to each project. It is difficult for a student to know just how well he did. As also shown in Fig. II, some instructors were consistently high and others were consistently low. This could be harmful in either case.

A grade much lower than the student felt he did could be very discouraging while a high grade when the student felt he did poorly could be quite confusing. The most extreme case is shown in Columns 2 and 2A, item number 45, where the grade ranges from an "A" to a "D". This kind of difference is difficult to explain to a student.

The graphs in Tables II and III, Fig. 5 and 6 respectively show in a more concise statistical form the kind of consistency that was found. Where we hoped for a correlation coefficient of .8, ninety-one percent of the correlations fall below the .5 level on the graph. Of the correlations above this level, two of them are the same instructor comparisons. Many of the correlations do not pass a test of significance which in this experiment means that the instructors could have done as well by filling out the grade sheets without referring to the projects at all.

I believe the evidence presented here is conclusive. The present grading system as illustrated is not a valid system. I believe we run a high risk of inhibiting the creative potential of an individual with a grading system that lacks the consistency that this one does. There are two purposes for grading an art project; reward and motivation, and both are equally important. However, effect must be considered also. I would recommend that art educators study the goals and purposes of art and establish evaluation standards in line with effects of motivation and reward as recognized by current behavioral research.

CHAPTER 2

COMPARISON BETWEEN A NON-GRADED GROUP AND A GRADED GROUP

THE CONTROL GROUP

This group was a class of ninth grade students. The course was elective and for the duration of one year. Class size was 23. There were 15 female and 8 male and IQ's ranged from average to well above average.

The course was divided into units including ceramics, jewelry, drawing, painting, textiles and weaving, printmaking and design. Each unit was begun with a demonstration and discussion of the materials and methods available. Each student chose his own direction and project design within the limitations of the materials and methods. (There were few limitations).

There was individual evaluation and progress reports as the unit progressed with the final grade on the product at the end of the unit. All units were then averaged within a quarter to arrive at quarterly grades.

THE EXPERIMENTAL GROUP

This group was also a class of ninth grade elective art students. The class size was 17. There were 11 female and 6 male and IQ's ranged from above average to well above average.

This group was given the same units but they had the flexibility

to contract, individually, from those units allowing to plan for more or less time with some units depending on individual need and interest. They were taught by the same instructor, had the same demonstrations, the same equipment and materials were available. There was also more individual time available because of the smaller class size.

The experimental group was given the grade of "A" on their report cards and they were filed for submittal at the proper time. This in effect eliminated the pressure of a grade. Each student periodically discussed progress and evaluation of their contract with the instructor.

At the end of each quarter comparisons were made between the two groups. The control group was on the whole much more successful. Almost all completed each unit and was pleased with the results. They were easily motivated and eager to work.

The experimental group was not easily motivated, displayed frequent indecision and confusion. They spent a great deal of time discussing unrelated topics, did not get along as well as a group and were much more difficult to interest in demonstrations. Though they were not fulfilling their contracts, they were not overly concerned and felt the experience was enjoyable. At the conclusion of the year only one individual in this group came near to finishing the contract.

The experimental group on the whole was much less informed on materials and processes than were the control group students. While the control group had on the average of 8 completed projects, the experimental group had 3 persons with 2 completed projects, 6 with 1, 1 with 5 and the rest did not complete even one project, yet in in-

dividual interviews at the conclusion of the year, only one student expressed concern or displeasure with the results and only two expressed a slight sense of guilt over having received an "A" for the course.

CONCLUSION

It is not difficult to see the effect on the experimental group and I would conclude that while there is a great need in art education for grading reform, the grade still provides a motivational device which effects learning. The progress and learning experienced by the control group was far greater than that of the experimental group.

CHAPTER 3

THE EFFECT OF TWO GRADING MODELS ON ART INTEREST AS MEASURED BY THE KUDER PREFERENCE TEST

THE CONTROL GROUP

A senior high school with 430 elective students and an art staff of four was chosen to remain on the traditional grading system using the art product as the basis for a final grade. There were courses offered in ceramics, weaving, printmaking, painting, jewelry and drawing.

The students ranged from below average to well above average IQ and came from predominately educated parents.

THE EXPERIMENTAL GROUP

A senior high school with 280 elective students and an art staff of 2.4 was chosen as the experimental school. Grading was to be done on effort, attitude, use of materials and time used, but a grade was not to be assigned to the final product. The students were also given the option of choosing pass-fail but only 3% of them chose this option. This school also had a below to well above average IQ range and came from predominately educated parents but a higher percentage of them came from parents holding a high school diploma or less. This school also offered the same courses and had approximately the same equipment and materials available.

The program was followed for one year in both schools. While each school was using some sort of grading system we were interested in the effect the different systems might have on quantity of work, quality of work and the student's interest in the program.

At the conclusion of the year the quantity and quality of the work was not significantly different but there seemed to be a big difference in interest as demonstrated by the increased enrollment in the experimental school. While both schools had equal total enrollment, the control school remained the same in art enrollment and the experimental school increased by 125 students.

The decision was made to continue the program for another year and we would measure the students attitude toward art. The Kuder Preference Test was used and the following Hypothesis was formulated:

Given two similar art classes, one group (the control group) being graded on the final product, the other group (experimental group) to be graded on criteria other than the final product.

HYPOTHESIS

Operating under the aforementioned conditions the experimental group should show a significant change in attitude toward art while the control group should show no significant change.

PROCEDURE

The students were given the Kuder Preference Test at the beginning of the school year. The group was chosen from a table of random samples using all of the sophomore art students at Ramsey Senior High

(control group) and all of the sophomore art students at Kellogg Senior High School (experimental group). Thirty students out of each group of approximately 200 were tested in the fall. Due to drops and moving there were 24 post-tested in the experimental group and 26 post-tested in the control group leaving those numbers for the final "N" for statistical purposes.

Each of the high school groups experienced similar types of programs. The class sizes were identical (22), the physical room size was similar as was the materials available and the equipment.

The students in the control group received a letter grade on each project and a quarterly grade. The experimental group received verbal evaluation of their progress and received a quarterly grade based on effort, attitude, their effectiveness at carrying the project through and their use of materials. A grade was not placed on the final product.

In the experimental group the post-test results showed that 13 students had increased their interest score and 11 had decreased. In the control group 18 had decreased in interest while 7 had increased. By applying a standard "T" score to the results, it shows that there was no significant difference at the .05 level for the experimental group and a significant difference for the control group.

CONCLUSION

Those results negate the original hypothesis that the experimental group would increase art interest. Instead the results show the opposite effect, that of showing a decrease in interest in the

control group. Further examination of the groups studied can help to understand this result a little better, however. The groups being studied are students that have chosen art as an elective and therefore probably already have a high interest in art. Examining the pre-test of each group will substantiate this. It would seem logical that interest then would be more difficult to increase than to decrease. Also throughout this study we have been concerned with the negative effect of grading art projects. The results of the interest test definitely shows that a negative effect did take place in the control group. The result is essentially the same even though the original hypothesis did not test out.

CHAPTER 4

SUMMARY AND CONCLUSION

I. SUMMARY

This paper and the work involved in the research was not intended to defend an art program for the purpose of preparing students for doing better art in later grades nor is it intended to insure aesthetic growth or awareness in our society. The purpose is to point out the effect on self-concept through creative expression. Without a healthy self-concept all other learning that takes place, at some point in life, may be negated. Learning, of course, is not the only human factor affected by a weak self-concept. Other areas of daily living can be equally under-developed.

"Wadja Get", a recent book dealing with the grading in American Education, begins with a discussion of grading creative products and the students there too found it difficult to deal with the pros and cons of grading. While most thought it was unfair to assign a grade, those that were good in the area felt that they were slighted if grades weren't assigned.

During the course of this study on grading in the Roseville schools, a student questionaire was given to 329 students in art courses at the experimental school. Of the 329 students, 310 felt the system was fair and 9 responded as unfair, the rest were undecided. They were also asked if they felt all art teachers graded the same and 183 responded "yes" and 109 responded "no". The rest didn't know. When asked what

type of grading they would prefer, 246 chose "A" through "F" and 50 chose pass-fail while 17 chose no grade.

In the first phase of this study on grading in the Roseville schools we considered the consistency among art teachers to arrive at a grade on an art project and found a lack of consistency even within the same teacher and it was concluded that this could be confusing to the student. This motivated the second phase of the study on grading using the experimental group with what amounted to no grade and compared it to the graded control group. This experiment presents a strong case for the grade as a motivational factor or a reward. The problem then becomes not the particular grade but what the grade stands for and how or on what it is given.

The third phase of the grading study measured the effect on interest in art after a year of the students experiencing grading based on something other than the judged quality of the project. While the hypothesis stated there would be a significant difference in attitude under this experimental system but was disproved, it showed a significant drop in attitude or interest in art at the control school where the traditional grade based on quality of the product was used. At the experimental school the grade acted as a motivational device but was not threatening because the grade was put on other criteria rather than the resultant product although it should be noted that most students still inquired as to what grade they would get on their final project. Moving away from the concept of grading on the product was difficult. It takes a whole re-education process to get the student to understand what the grade is measuring. Once they understood this, they were freer to experiment and create with materials with fewer inhibitions.

CONCLUSION

While a strong case can be made for grading in art, an equally strong case can be made for assigning the grade to something other than the product. Enough research has certainly been done to show that the product of the human creative experience is sensitive to criticism because of its close proximity to the self or expression of the self. This study has tried to point out some of that supportive research. A further study of those principles and other related studies would certainly be advisable to anyone who would like to better understand the growth and development of children.

The first phase of this study shows the need for a grade as a motivational force, but we must remember the awarding of a grade must be sensitively and carefully administered basing it on criteria that will not interfere with ego or self-concept development but rather deal with the learning taking place during the exploration of the process. This is to suggest that elimination of the grade from the product will help to protect the self-image or emotional development of the child.

In recent months we have heard more and more about "Art Therapy" in art education. We mention it here because it has a great similarity to the problems in emotional development and evaluation effects found in this study. Most people would construe this subject as one that deals only with disturbed children. While this is often the case, a thorough examination of the subject will show an extensive use in the field of the principles that Lowenfeld and others like him have advocated with healthy children. It only makes common sense to realize that implication of these

field to gain better insight into the problems of human development and to work for solutions to a more widely used, adequate system of evaluation.

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APPENDIX

EXPERIMENTAL GROUP

$t = 1.09$

TUDENT UMBER	PRE-TEST	VARIANCE	X^2	POST TEST	VARIANCE	X^2
1	41	1	1681	40	-1	1600
2	43	3	1849	38	17	3364
3	36	-4	1206	31	-10	961
4	45	5	2025	38	-3	1444
5	52	12	2704	50	9	2500
6	40	0	1600	44	3	1936
7	44	4	1936	39	-2	1521
8	47	7	2209	41	0	1681
9	45	5	2025	51	10	2601
10	43	3	1849	37	-4	1369
11	42	2	1764	40	-1	1600
12	43	3	1848	41	0	1681
13	33	-7	1089	39	-2	1521
14	18	-22	324	21	-20	441
15	52	12	2704	47	6	2209
16	16	-24	256	21	-20	441
17	14	-26	196	25	-16	625
18	40	0	1600	41	0	1681
19	45	5	2025	52	11	2704
20	45	5	2025	43	2	1849
21	50	10	2500	54	14	2916
22	28	-12	784	26	-15	676
23	41	1	1681	45	4	2025
24	45	5	2025	49	8	2401
25						
26						
Σ	948		39995	973		41747
$\bar{X}$	39.5			40.54		
S	10.3			9.78		
ΣX		-12			-10	

CONTROL GROUP

STUDENT NUMBER	PRE-TEST	VARIANCE	X^2	POST TEST	VARIANCE	X^2					$t = 5.15$
1	34		1156	40		1600					
2	55		3025	52		2704					
3	38		1444	34		1156					
4	43		1849	47		2209					
5	50		2500	49		2401					
6	34		1156	33		1089					
7	58		3364	46		2116					
8	29		841	24		576					
9	43		1849	42		1764					
10	42		1764	38		1444					
11	19		361	24		576					
12	47		2209	50		2500					
13	39		1521	36		1296					
14	39		1521	26		676					
15	38		1444	44		1936					
16	49		2401	46		2116					
17	52		2704	47		2209					
18	49		2401	51		2601					
19	49		2401	44		1936					
20	32		1024	27		729					
21	51		2601	54		2916					
22	52		2704	44		1936					
23	48		2304	12		144					
24	41		1681	40		1600					
25	46		2116	34		1156					
26											
Σ	1077		48341	948		41386					
$\bar{X}$	43.08			37.92							
S											
Σx											

PROJECT EVALUATION FORM I

INSTRUCTOR_____ DATE_____ GRADE_____

GRADE	COMMENT	NO.	GRADE	COMMENT
		26		
		27		
		28		
		29		
		30		
		31		
		32		
		33		
		34		
		35		
		36		
		37		
		38		
		39		
		40		
		41		
		42		
		43		
		44		
		45		
		46		
		47		
		48		
		49		
		50		

FIG. 1

GRADE RECORDING FORM II

330	340	350	380	390	400	410	420	430	440	450	460	360	370		Projects
1A	2	2A	3	4	5	6	7	8	9	10	11	12	12A		
B	C	C	C	A	B	A	A	A	A	B	A	A	A		1
B	B	C	C	A	B	A	A	A	B	B	A	A	A		2
C	C	C	B	B	C	B	A	C	B	C	B	A	A		3
C	C	C	C	C	C	C	B	A	B	B	B	C	C		4
C	C	C	B	A	C	B	B	B	A	B	A	B	B		5
C	C	C	B	C	B	B	B	C	B	C	A	A	A		6
B	C	C	B	B	C	C	B	A	B	B	A	B	B		7
C	C	C	C	A	C	C	B	A	B	B	B	B	B		8
C	D	C	C	C	C	D	C	C	C	C	C	C	C		9
C	C	C	B	B	C	A	A	B	A	B	A	A	A		10
C	C	C	B	B	B	B	B	A	B	B	A	B	B		11
B	C	C	C	C	B	A	A	B	B	C	B	A	A		12
C	C	C	C	C	B	C	B	C	B	B	B	B	B		13
C	C	C	C	C	B	B	B	C	C	C	B	B	A		14
C	C	C	C	B	C	B	B	B	C	C	C	B	B		15
C	D	D	D	C	C	C	B	D	C	C	C	C	C		16
C	C	C	C	C	C	B	B	C	A	B	B	B	B		17
C	B	B	C	C	B	C	B	B	B	B	B	B	C		18
C	D	D	C	B	C	C	B	B	C	B	C	B	C		19
C	D	D	C	C	B	C	B	C	B	B	B	A	A		20
C	D	D	C	B	C	C	B	D	C	C	C	C	C		21
B	C	C	C	A	B	C	B	A	B	B	B	A	B		22
C	B	C	C	C	C	A	A	C	B	B	C	A	A		23
C	D	D	C	B	D	B	C	C	C	C	C	B	B		24
C	C	C	B	B	C	C	C	B	C	C	C	B	B		25
C	C	C	C	D	C	B	A	C	B	C	C	B	B		26
C	C	D	C	C	D	C	D	D	A	C	D	C	C		27
C	B	B	C	D	C	A	C	A	A	B	C	B	B		28
C	C	C	C	C	D	B	C	C	B	C	B	C	C		29
D	B	C	C	D	C	B	C	A	B	C	D	B	B		30
D	C	C	D	D	D	B	B	C	C	C	C	C	B		31
C	C	C	C	D	D	B	D	D	B	B	D	C	C		32
D	D	D	D	D	C	B	C	D	C	D	D	C	C		33
C	C	C	C	D	B	B	C	D	A	C	D	C	C		34
C	C	C	C	D	C	B	C	C	B	C	C	B	C		35
C	C	C	C	D	D	B	C	B	B	C	C	C	C		36
C	D	C	C	D	D	C	C	C	B	C	D	C	C		37
C	C	D	C	D	C	B	C	A	A	C	D	B	C		38
C	C	C	C	D	D	B	C	C	B	B	D	B	B		39
D	D	D	D	D	C	B	C	D	C	D	D	C	C		40
C	B	B	C	C	B	B	C	B	A	C	D	B	B		41
B	B	C	C	B	D	B	C	B	A	C	C	C	C		42
C	C	C	B	B	D	B	C	A	B	C	B	B	C		43
C	C	C	C	C	B	C	C	B	D	C	B	C	C		44
B	D	A	C	B	C	B	C	B	C	C	C	B	C		45

FIG. 2

GRADE RECORDING FORM II

0	330	340	350	380	390	400	410	420	430	440	450	460	360	370		Projects
	1A	2	2A	3	4	5	6	7	8	9	10	11	12	12A		
	2	3	3	3	1	2	1	1	1	1	2	1	1	1		1
	2	2	3	3	1	2	1	1	1	2	2	1	1	1		2
	3	3	3	2	2	3	2	1	3	2	3	2	1	1		3
	3	3	3	3	3	3	3	2	1	2	2	2	3	3		4
	3	3	3	2	1	3	2	2	2	1	2	1	2	2		5
	3	3	3	2	3	2	2	2	3	2	3	1	1	1		6
	2	3	3	2	2	3	3	2	1	2	2	1	2	2		7
	3	3	3	3	1	3	3	2	1	2	2	2	2	2		8
	3	4	3	3	3	3	4	3	3	3	3	3	3	3		9
	3	3	3	2	2	3	1	1	2	1	2	1	1	1		10
	3	3	3	2	2	2	2	2	1	2	2	1	2	2		12
	2	3	3	3	3	2	1	1	2	2	3	2	1	1		13
	3	3	3	3	3	2	3	2	3	2	2	2	2	3		14
	3	3	3	3	3	2	2	2	3	3	3	2	2	1		15
	3	3	3	3	2	3	2	2	2	3	3	3	2	2		16
	3	4	4	4	3	3	3	2	4	3	3	3	3	3		17
	3	3	3	3	3	3	2	2	3	1	2	2	2	3		18
	3	2	2	3	3	2	3	2	2	2	2	2	2	3		19
	3	4	4	3	2	3	3	2	2	3	2	3	2	3		20
	3	4	4	3	3	2	3	2	3	2	3	3	1	1		21
	3	4	4	3	2	3	3	2	4	3	3	3	3	3		22
	2	3	3	3	1	2	3	2	1	2	2	2	1	2		23
	3	2	3	3	3	3	1	1	3	2	2	3	1	1		24
	3	4	4	3	2	4	2	3	3	3	3	3	2	2		25
	3	3	3	2	2	3	3	3	2	3	3	3	2	2		26
	3	3	4	3	4	3	2	1	3	2	3	3	2	2		27
	3	3	4	3	3	4	3	4	4	1	3	4	3	3		28
	3	2	2	3	4	3	1	3	1	1	2	3	2	2		29
	3	3	3	3	3	4	2	3	3	2	3	2	3	3		30
	4	2	3	4	4	3	2	3	1	2	3	4	2	2		31
	4	3	3	3	4	4	2	2	3	3	2	3	3	2		32
	4	3	4	3	4	4	2	4	4	2	2	4	3	3		33
	4	3	4	3	4	4	2	3	4	3	4	4	3	3		34
	3	3	4	3	4	3	2	3	4	1	3	4	3	3		35
	3	3	3	3	4	3	2	3	3	2	3	3	2	3		36
	3	4	3	3	4	4	2	3	2	2	3	3	3	3		37
	3	4	4	3	4	4	3	3	3	2	3	4	3	3		38
	3	4	4	3	4	4	2	3	1	1	3	4	4	3		39
	3	4	3	3	4	3	2	3	3	2	2	4	2	3		40
	4	4	4	3	4	4	2	3	4	3	4	4	2	2		41
	3	2	2	3	3	2	2	3	2	1	3	4	2	2		42
	3	2	3	2	2	4	2	3	2	1	3	3	3	3		43
	3	3	2	3	3	2	3	3	2	2	3	2	2	3		44
	2	4	1	3	2	3	2	3	2	3	3	3	2	3		45

FIG. 3

TABLE - 1

	0	0	15	21	9	
4						0
3			/	////	//	7
2			///// ///	///// ///// ////	///// /	28
1			///// /	///	/	10
0						0
	0	1	2	3	4	N = 45

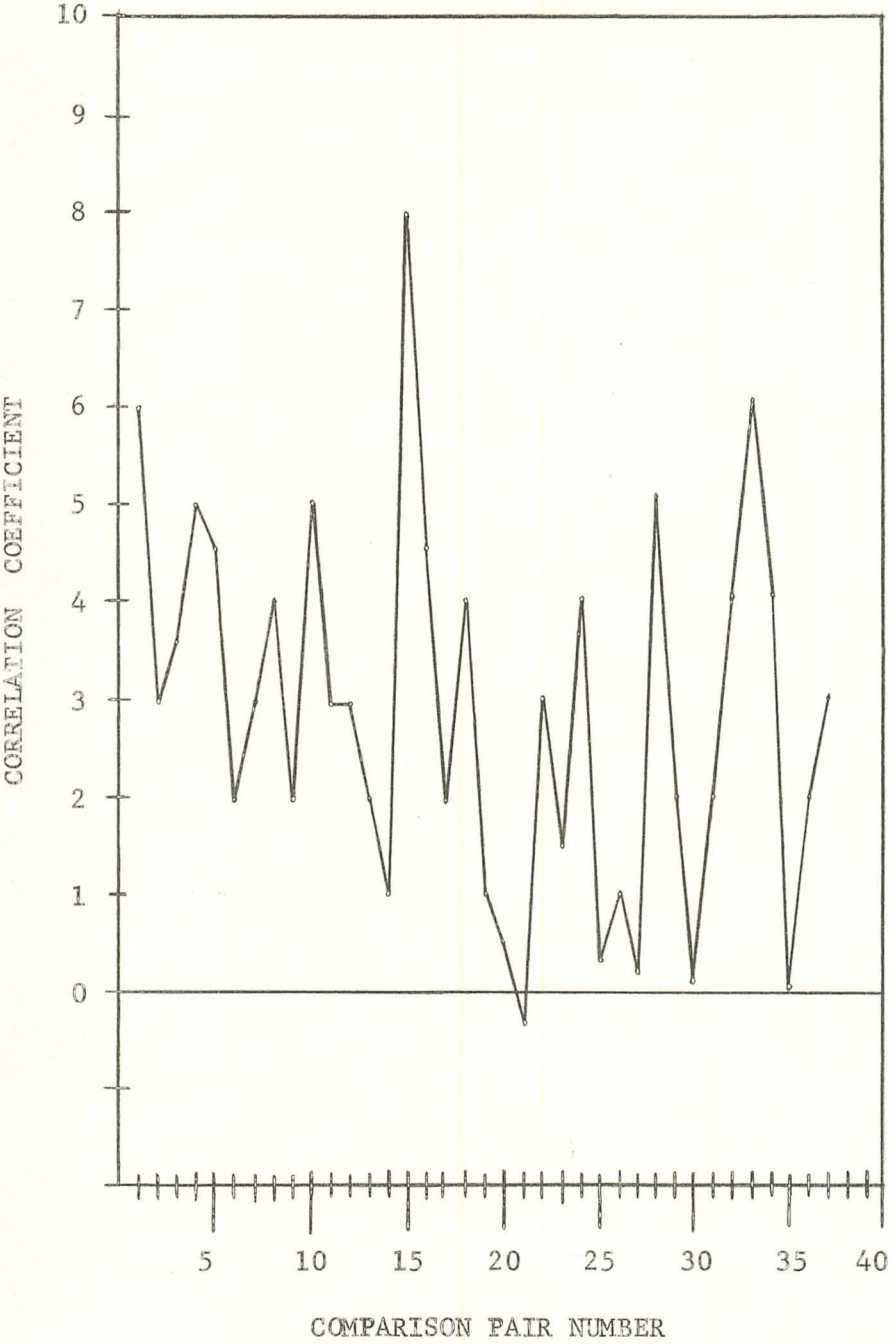
fy	fy^2	fx	fx^2	xy
0	0	36	144	0
21	63	63	189	66
56	112	30	60	160
10	10	0	0	25
0	0	0	0	0
Σ 87	185	129	393	251

$$= \frac{251 - \frac{(129)(87)}{45}}{\sqrt{\left((393 - \frac{(129)^2}{45}\right)\left(185 - \frac{(87)^2}{45}\right)}} = \frac{251 - 250}{\sqrt{(393-370)(185-168)}} = \frac{1}{\sqrt{391}}$$

$$r = \frac{1}{20} = .05$$

FIG. 4

TABLE II



GRAPH BASED ON 37 CORRELATIONS

FIG. 5

TABLE III

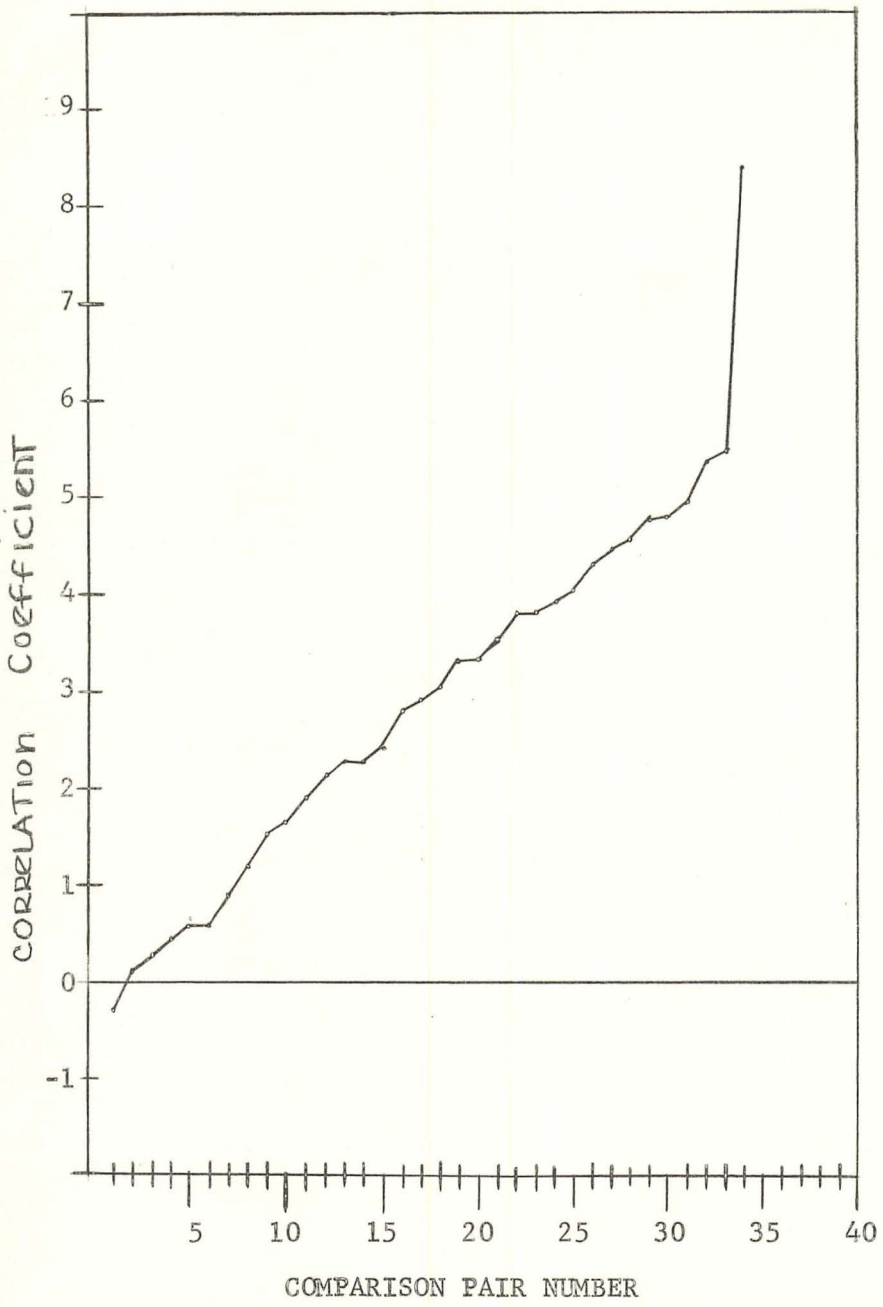


FIG. 6

1.	8-6 =	-.03
2.	7-11=	.01
3.	7-8 =	.02
4.	8-12=	.03
5.	8-5 =	.05
6.	9-11=	.05
7.	4-15=	.09
8.	8-13=	.12
9.	8-10=	.15
10.	2-3 =	.16
11.	4-14=	.18
12.	7-12=	.21
13.	7-10=	.22
14.	2-15=	.22
15.	9-10=	.24
16.	3-14=	.28
17.	3-15=	.29
18.	8-9 =	.30
19.	1-3 =	.32
20.	2-4 =	.32
21.	1-4 =	.35
22.	9-12=	.38
23.	8-11=	.38
24.	11-12=	.39
25.	2-14=	.40
26.	7-13=	.43
27.	1-15=	.44
28.	5-6 =	.45
29.	7-9 =	.47
30.	3-4 =	.47
31.	1-14=	.49
32.	1-2 =	.63
33.	9-13=	.64
34.	14-15=	.83